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IMAGES IN CARDIOLOGY

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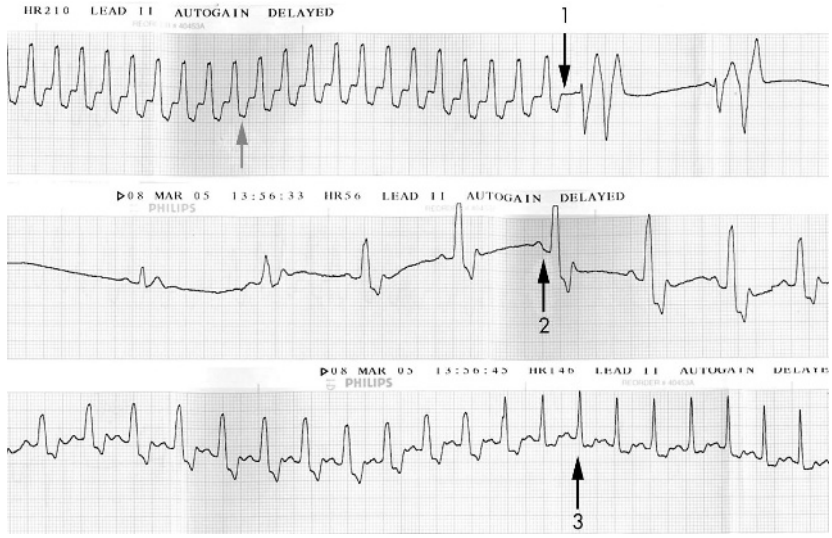
Mahaim tachycardia and intravenous adenosine

A 35-year-old woman presented to the emergency department with palpitations and breathlessness. ECG recordings demonstrated a wide complex tachycardia with left bundle branch block (LBBB) morphology. A rhythm strip (lead II) is shown. Retrograde P waves are visible after each QRS complex (grey arrow). Intravenous adenosine was administered as a rapid 12 mg bolus, resulting in sudden termination of the tachycardia (arrow 1). After a few ventricular escape beats, sinus node activity returns with an LBBB QRS morphology similar to that during the tachycardia (arrow 2). Over the next few seconds the sinus rate increases and the QRS complexes become gradually narrower until they look almost normal.

Mahaim fibres are atriofascicular or atrioventricular accessory pathways that conduct slowly with decremental properties and only in the antegrade direction from atrium to ventricle. Their ventricular insertion is usually into or adjacent to the right bundle or right ventricular free wall. Mahaim tachycardias have their antegrade limb through the accessory pathway (producing a left bundle branch block morphology) and retrograde conduction through the atrioventricular node with visible retrograde P waves. Adenosine terminates the tachycardia as both the atrioventricular node and Mahaim fibre are blocked. The sinus node is also transiently affected. During the first few sinus beats, there is antegrade conduction preferentially through the Mahaim fibre, producing a pronounced ventricular pre-excitation pattern similar to left bundle branch block and identical to the morphology during tachycardia. During the subsequent sinus tachycardia and increase in sympathetic activity that follows, and as the effects of the adenosine wear off, atrioventricular node conduction improves and pre-excitation becomes less pronounced before almost disappearing.



Continuous ECG rhythm strip of lead II. The grey arrow indicates retrograde P waves during tachycardia; arrow 1 indicates tachycardia termination with adenosine; arrow 2 indicates sinus rhythm with pronounced ventricular pre-excitation; arrow 3 indicates sinus tachycardia with minimal pre-excitation.

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